

Name _____

HONORS ALGEBRA 2 Final Exam Objectives
The final exam is on Chapters 6, 7, 8, 10, and 11 (not Chapter 9)

Students should be able to:

Chapter 6-- Quadratic Functions and Inequalities

1. Graph quadratic functions.
2. Find and interpret the maximum and minimum values of a quadratic function.
3. Solve quadratic equations by graphing.
4. Estimate solutions of quadratic equations by graphing.
5. Solve quadratic equations by factoring.
6. Write a quadratic equation with given roots.
7. Solve quadratic equations by using the Square Root Property.
8. Solve quadratic equations by completing the square.
9. Solve quadratic equations by using the Quadratic Formula.
10. Use the discriminant to determine the number and type of roots of a quadratic equation.
11. Analyze quadratic functions of the form $y = a(x - h)^2 + k$.
12. Write a quadratic function in the form $y = a(x - h)^2 + k$.
13. Graph quadratic inequalities in two variables.
14. Solve quadratic inequalities in one variable.

Chapter 7-- Polynomial Functions

1. Evaluate polynomial functions.
2. Identify general shapes of graphs of polynomial functions
3. Graph polynomial functions and locate their real zeros.
4. Find the maxima and minima of polynomial functions.
5. Write expressions in quadratic form.
6. Use quadratic techniques to solve equations.
7. Evaluate functions using synthetic substitution.
8. Determine whether a binomial is a factor of a polynomial by using synthetic substitution.
9. Determine the number of roots for a polynomial equation.
10. Find the zeros of a polynomial function.
11. Identify the possible rational zeros of a polynomial function.
12. Find all the rational zeros of a polynomial function.
13. Find the sum, difference, product, and quotient of functions.
14. Find the composition of functions.
15. Find the inverse of a function or relation.
16. Determine whether two functions or relations are inverses.
17. Graph and analyze square root functions.
18. Graph square root inequalities.

Chapter 8--Conic Sections

1. Find the midpoint of a segment on the coordinate plane.
2. Find the distance between two points on the coordinate plane.
3. Write equations of parabolas in standard form.
4. Graph parabolas.
5. Write equations of circles.
6. Graph circles.
7. Write equations of ellipses.
8. Graph ellipses.
9. Write equations of hyperbolas.
10. Graph hyperbolas.
11. Write equations of conic sections in standard form.
12. Identify conic sections from their equations.
13. Solve systems of quadratic equations algebraically and graphically.
14. Solve systems of quadratic inequalities graphically.

Chapter 10--Exponential and Logarithmic Relations

1. Graph exponential functions.
2. Solve exponential equations and inequalities.
3. Evaluate logarithmic equations and inequalities.
4. Solve logarithmic equations and inequalities.
5. Simplify and evaluate expressions using the properties of logarithms.
6. Solve logarithmic equations using the properties of logarithms.
7. Solve exponential equations and inequalities using common logarithms.
8. Evaluate logarithmic expressions using the Change of Base Formula.
9. Evaluate expressions involving the natural base and natural logarithms.
10. Solve exponential equations and inequalities using natural logarithms.
11. Use logarithms to solve problems involving exponential growth and decay.

Chapter 11--Sequence and Series

1. Use arithmetic sequences.
2. Find arithmetic means.
3. Find the sums of arithmetic series.
4. Use sigma notation.
5. Use geometric sequences.
6. Find geometric means.
7. Find sums of geometric series.
8. Find specific terms of geometric series.
9. Find the sum of infinite geometric series.
10. Write repeating decimals as fractions.

Honors Algebra 2 Final Exam Formula Sheet

$$a_n = a_1 + (n - 1)d$$

$$a_n = a_1 \bullet r^{n-1}$$

$$S_n = \frac{n}{2}(a_1 + a_n)$$

$$S_n = \frac{a_1(1 - r^n)}{1 - r}$$

$$S_n = \frac{n}{2}[2a_1 + (n - 1)d]$$

$$S_n = \frac{a_1 - a_n r}{1 - r}$$

$$\text{Infinite } S_\infty = \frac{a_1}{1 - r}$$

$$A = P\left(1 + \frac{r}{n}\right)^{nt} \quad y = ae^{-kt} \quad y = a(1 + r)^t \quad y = a(1 - r)^t$$

Conic Equations

Parabola $y = a(x - h)^2 + k$ $x = a(y - k)^2 + h$

Circle $(x - h)^2 + (y - k)^2 = r^2$

Ellipses $\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$ $\frac{(x - h)^2}{b^2} + \frac{(y - k)^2}{a^2} = 1, c^2 = a^2 - b^2$

Hyperbolas $\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$ $\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1, c^2 = a^2 + b^2$

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Honors Algebra 2 Final Exam Review

The following is a review of chapters 6, 7, 8, 10, and 11. Do all problems on a separate sheet of paper and show your work! For more problems visit the extra practice sections in the back of your textbook.

A. Chapter 6:

Use the discriminant $b^2 - 4ac$ to determine the nature of the roots.

1. $2x^2 - 4x + 3 = 0$

2. $b^2 - 7b + 5 = 0$

3. $5x^2 + 2x = 3$

4. Find k such that $x^2 - 5x + k = 0$ has two imaginary roots. ($b^2 - 4ac < 0$)

Write a quadratic equation having the given solution set. ($x^2 - (r_1 + r_2)x + r_1 \cdot r_2 = 0$)

5. $\{3 + i, 3 - i\}$

6. $\{-4, 3\}$

7. $\left\{\frac{3 \pm 2i}{2}\right\}$

Write a polynomial of smallest degree with integral coefficients having the given roots.

8. $2i, -3$

9. $\frac{1}{4}, \frac{3}{4}, 2$

10. Solve and graph: $x^2 + 3x - 10 < 0$

B. Chapter 7:

1. Given $P(x) = x^4 - x^3 + x - 1$, find $P(3)$.

2. Use synthetic division: Given $x^5 + 8x^3 + 2 \div (x - 2)$.

3. Find all zeroes of $f(x) = x^3 - 10x^2 + 34x - 40$ if $3 + i$ is one zero.

4. Find all zeroes given $f(x) = x^3 - 3x^2 - 53x - 9$

5. Find all real roots using the calculator: $x^3 + 3x^2 - 2x + 1 = 0$.

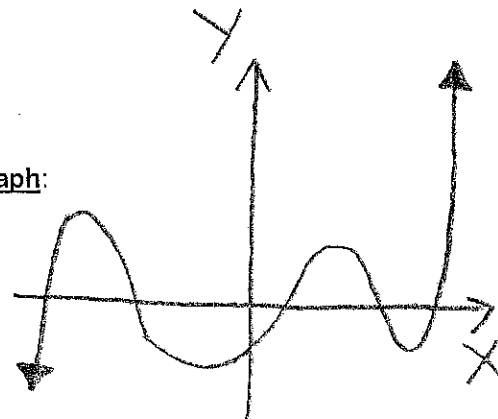
6. Find the inverse of $f(x) = 3x - 4$.

7. For the given graph of $f(x)$,

a) describe the end behavior

b) determine whether it is an odd-degree or an even-degree polynomial function

c) state the number of real zeros

Graph:

C. Chapter 8:

Write the equation of the circle with the given the information.

1. $r = 5$; $C(-3, 4)$

2. $r = \frac{2}{3}$; $C(3, 2)$

3. Diameter endpoints: $(5, 2)$ $(-3, -2)$

For each ellipse, determine whether the major axis is horizontal or vertical.

4. $\frac{x^2}{16} + \frac{y^2}{49} = 1$

5. $x^2 + 9y^2 = 36$

6. $25x^2 + 16y^2 = 1600$

For each parabola, determine the vertex, focus, axis of symmetry, and directrix.

7. $y = (x+2)^2 - 7$

8. $y = x^2 - 3x + 5$

9. $x = y^2 - 3$

For each hyperbola, find the coordinates of the center, vertices, and foci.

10. $\frac{y^2}{49} - \frac{x^2}{4} = 1$

11. $\frac{x^2}{16} - \frac{y^2}{16} = 1$

12. $x^2 - \frac{y^2}{4} = 1$

13. Solve the following system: $x^2 + y^2 = 100$; $y = 2 - x$

Write the equation in standard form for the given conic section with the given information.

14. Parabola; $V(2, -3)$ and $F(0, -3)$

15. Ellipse; Endpoints of major axis $(-2, 7)$ & $(4, 7)$; Endpoints of minor axis $(1, 5)$ & $(1, 9)$

16. Hyperbola; Vertices $(-3, 0)$ & $(3, 0)$; conjugate axis of length 8 units

17. Write the equation in standard form by completing the square. State whether the graph is a parabola, circle, ellipse, or hyperbola.

$$x^2 + 4y^2 + 2x - 24y + 33 = 0$$

D. Chapter 10:

1. Sketch the graph of $y = (\frac{1}{4})^x$.

Solve.

2. $4^x = 32$

3. $27^x = \frac{1}{3}$

4. $9^{(x-2)} = 81$

Evaluate.

5. $\log_4 128$

6. $\log_{\frac{1}{3}} 27$

7. $\log_{11} \frac{1}{121}$

Solve.

8. $\log_3 t = 5$

9. $\log_x \frac{1}{16} = -4$

10. $\log_{1000} b = \frac{-1}{3}$

Express without using multiplication or division.

11. $\log(5\sqrt[4]{81})$

12. $\log \left(\frac{x^2}{3y} \right)$

13. $\log \left(3\sqrt[5]{\frac{x^7}{y^2}} \right)$

Find the given value.

14. $\log 2.71$

15. $\log x = 0.6749$

Solve.

16. $\ln(2x) = 4$

17. $3e^{3x} + 8 = 26$

F. Chapter 11:

Find the next 3 terms in each arithmetic sequence.

1. $-5, -1, 3, 7, \dots$

2. $6, 8, 10, 12, \dots$

3. $a_1 = 5$ and $a_8 = 54$, what is the 4th term of the arithmetic sequence?

4. Find 3 arithmetic means between 8 and 17.

5. Find the seventh term of the geometric sequence: 7, -21, 63, ...

6. In a geometric sequence, $a_1 = 15$, $a_4 = 405$, find r .

7. Find two geometric means between 7 and 56.

8. George took a job for \$18,000 per year with guaranteed \$500 raises every four months. What was his salary at the end of three years?

OVER >>>>

Find the sum.

9. $\sum_{k=1}^5 (3k - 1)$

10. $\sum_{k=1}^5 \left(\frac{3}{5}k \right)$

11. $\sum_{k=1}^5 3^{k-2}$

12. A contest winner will receive prize money over 16 months. The first month's payment is \$3000, and each succeeding payment will be \$200 more than the preceding one. How much money is the total prize money?

Find the sum of each infinite geometric series.

13. $\frac{3}{2} + 1 + \frac{2}{3} \dots$

14. $20 + 4 + \frac{4}{5} + \dots$

Final Exam Review Answer Key

A. Chapter 6:

- ① 2 imaginary ② 2 real, irrational ③ 2 real, rational
④ $K > \frac{25}{4}$ ⑤ $x^2 - 6x + 10 = 0$ ⑥ $x^2 + x - 12 = 0$
⑦ $4x^2 - 12x + 13 = 0$ ⑧ $x^3 + 3x^2 + 4x + 12 = 0$
⑨ $16x^3 - 48x^2 + 35x - 6 = 0$ ⑩ $-5 < x < 2$
-

B. Chapter 7:

- ① $p(3) = 56$ ② $x^4 + 2x^3 + 12x^2 + 24x + 48 + \frac{98}{x-2}$
③ $\{3 \pm i, 4\}$ ④ $\{9, -3 \pm 2\sqrt{2}\}$ ⑤ $x \approx -3.63$ (other 2 roots are imaginary)
⑥ $f^{-1}(x) = \frac{x+4}{3}$ ⑦ a) as $x \rightarrow -\infty, f(x) \rightarrow -\infty$
as $x \rightarrow +\infty, f(x) \rightarrow +\infty$
b) odd c) 5 real zeros
-

C. Chapter 8:

- ① $(x+3)^2 + (y-4)^2 = 25$ ② $(x-3)^2 + (y-2)^2 = \frac{4}{9}$
③ $(x-1)^2 + y^2 = 20$ ④ vertical ⑤ horizontal
⑥ vertical ⑦ $V(-2, -7)$ $F(-2, -6.75)$ a.o.s. $x = -2$
D: $y = -7.25$
⑧ $V(\frac{3}{2}, \frac{11}{4})$, $F(\frac{3}{2}, 3)$ a.o.s. $x = \frac{3}{2}$ D: $y = 2.5$
⑨ $V(-3, 0)$ $F(-2.75, 0)$ a.o.s. $y = 0$ D: $x = -3.25$

C. Chapter 8

⑩ $C(0,0) V(0,7) V(0,-7) F(0,\sqrt{53}) F(0,-\sqrt{53}) m = \pm \frac{7}{1}$

⑪ $C(0,0) V(4,0) V(-4,0) F(4\sqrt{2},0) F(-4\sqrt{2},0) m = \pm 1$

⑫ $C(0,0) V(1,0) V(-1,0) F(\sqrt{5},0) F(-\sqrt{5},0) m = \pm \frac{2}{1}$

⑬ $\{(8,-6) (-6,8)\}$ ⑭ $X = -\frac{1}{8}(y+3)^2 + 2$

⑮ $\frac{(x-1)^2}{9} + \frac{(y-7)^2}{4} = 1$ ⑯ $\frac{x^2}{9} - \frac{y^2}{16} = 1$

⑰ $\frac{(x+1)^2}{4} + \frac{(y-3)^2}{1} = 1$

D. Chapter 10:

① graph ② $X = \frac{5}{2}$ ③ $X = \frac{1}{3}$ ④ $X = 4$ ⑤ $\frac{7}{2}$

⑥ -3 ⑦ -2 ⑧ $T = 243$ ⑨ $X = 2$ ⑩ $b = \frac{1}{10}$

⑪ $\log 5 + \frac{1}{4} \log 81$ ⑫ $2 \log X - \log 3 - \log y$

⑬ $\log 3 + \frac{7}{5} \log X - \frac{2}{5} \log y$ ⑭ 0.4330 ⑮ 4.73

⑯ $X = 27.2991$ ⑰ $X = 0.5973$

F. Chapter 11:

① 11, 15, 19 ② 14, 16, 18 ③ $A_4 = 26$

④ 10.25, 12.5, 14.75 ⑤ $A_7 = 5,103$ ⑥ $r = 3$

⑦ 14, 28 ⑧ \$22,500 ⑨ $S_5 = 40$ ⑩ $S_5 = 9$

⑪ $S_5 = 40.\bar{3}$ ⑫ \$72,000 ⑬ $S_\infty = \frac{9}{2}$ ⑭ $S_\infty = 25$

HONORS ALGEBRA 2 FINAL EXAM REVIEW:

**** The following problems are some additional practice problems from the book that you can do to prepare for the final exam. You can check your answers in the back of the book. By correctly solving the problems in the Final Review packet and these additional review problems, as well as looking over your notes, you will definitely be prepared to succeed on the final exam. Good luck!

Chapter 6: Quadratic Functions and Inequalities

p. 338-340 # 29, 31, 37, 39, 41, 49, 57

Chapter 7: Polynomial Functions

p. 400-404 # 7, 21, 23, 39, 43, 45, 49, 51, 55

Chapter 8: Conic Sections

p. 462-466 # 11, 15, 19 – 23 odd, 27, 31 – 37 odd

Chapter 10: Exponential and Logarithmic Relations

p. 567-570 # 11 – 15 odd, 19, 21, 27, 31, 33, 37, 39, 43, 45, 49, 57, 61, 62, 64

Answers: 62) \$ 105.47 64) about 0.000385

Chapter 11: Sequences and Series

p. 623 – 626 # 11, 13, 17, 19, 23, 25, 29, 33

